

WE CLAIM:

1. A chemical solution distribution system for distributing chemical
5 solutions to a plurality of multiwell plates having N wells with I
subsets of M wells, I being an integer and greater than one, the
system comprising:
 - a plurality of liquid handlers, each said liquid handler
including:
 - 10 a head capable of moving in a Z-direction, said head having
M pipettes; and
 - a table configured to engage one of said plurality of
multiwell plates and movable in an X-Y plane relative to Z, said
table capable of moving to at least I different positions,
 - 15 wherein at each of said at least I different positions, said M
pipettes of said head are aligned with a different one of said I
subsets of M wells of said one of said plurality of multiwell plates,
and with the proviso that M is about 864 or less.
- 20 2. The chemical solution distribution system of claim 1, wherein said
chemical solutions are test chemicals and said plurality of
multiwell plates are used to store chemical libraries.
3. The chemical solution distribution system of claim 1, wherein said
25 chemical solutions comprise polynucleotides.
4. The chemical solution distribution system of claim 1, wherein said
system has I liquid handlers.

5. The chemical solution distribution system of claim 1, wherein each of said plurality of said liquid handlers further includes a wash station below said head, wherein said head is capable of moving said M pipettes into contact with solution in said wash station.

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6. The chemical solution distribution system of claim 4, said system further including a computational unit to reformat from low to high density multiwell plates.

10 7. The chemical solution distribution system of claim 1, said system further comprising at least one stacker, said stacker capable of storing said plurality of multiwell plates.

15 8. The chemical solution distribution system of claim 1, said system further including a conveyor belt, said conveyor belt capable of moving at least one of said plurality of multiwell plates between said plurality of said liquid handlers and at least one stacker.

20 9. The chemical solution distribution system of claim 7, wherein each of said plurality of multiwell plates has a lid, said system further including a delidder, said delidder capable of removing and replacing a lid on each of said plurality of multiwell plates and said conveyor belt further capable of moving said at least one of said plurality of multiwell plates between said plurality of said liquid handlers, said at least one stacker, and said delidder.

25 10. A chemical solution distribution system of claim 1, wherein M is equal to 96, N is equal to 384, and there are four liquid handlers.

11. The chemical solution distribution system of claim 1, where M is equal to 96.

5 12. The chemical solution distribution system of claim 1, where M is equal to 96 and N is equal to one of 384 or 864.

10 13. A chemical solution distribution system for distributing chemical solutions between at least one first multiwell plate having N wells with I subsets of M wells, I being an integer and greater than one and at least one solid substrate or at least one second multiwell plate having M sites or wells, the system comprising:

15 a plurality of liquid handlers, each liquid handling station including:

15 a head capable of moving in a Z-direction, said head having M pipettes; and

20 a table configured to engage one of said at least one first multiwell plate having N wells or said at least one second multiwell plate having M wells or said solid substrate and movable in an X-Y plane relative to Z, said table capable of moving to at least I different positions,

25 wherein at least at I different positions, said M pipettes of said head are aligned with a different one of the I subsets of M wells of the at least one multiwell plate having N wells or at least at one position said M pipettes of said head are aligned with said M wells of said at least one solid substrate or at least one second multiwell plate having M sites or wells, and with the proviso that M is about 864 or less.

14. The chemical solution distribution system of claim 13, wherein said table is movable to I plus one positions.

15. The chemical solution distribution system of claim 14, wherein M is equal to 96.

5 16. The chemical solution distribution system of claim 15, wherein N is equal to one of 384 or 864.

17. The chemical solution distribution system of claim 15, wherein there are I liquid handlers.

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18. A method of distributing chemical solutions between a plurality of plates having N wells with I subsets of M wells, I being an integer and greater than one, said method comprising the steps of:

15 aligning a subset of M wells of a first one of said plurality of plates with M pipettes of a first pipette station;

lowering said M pipettes of said first pipette station to engage said subset of M wells and aspirating solution from M wells into said M pipettes and dispensing solution from said M pipettes into a first set of M wells;

20 aligning a subset of M wells of a second one of the plurality of plates with M pipettes of a second pipette station; and

lowering said M pipettes of said second pipette station to engage said subset of M wells of said second one of the plurality of plates and one of aspirating solution from M wells into said M pipettes and dispensing solution from said M pipettes into a second set of M wells, and with the proviso that M

25 is about 864 or less.

19. The method of claim 18, wherein said samples are chemicals and said plurality of multiwell plates are used to store test chemicals.

20. The method of claim 19, wherein said chemicals comprise polynucleotides.

5 21. The method of claim 19, further comprising the step of providing a different solution to wash stations of the first liquid handler and said second liquid handler.

10 22. The method of claim 18, further comprising the steps of:
aligning a subset of M wells of a third one of said plurality of plates with M pipettes of a third pipette station;
lowering said M pipettes of said third pipette station to engage the subset of M wells of said third one of said plurality of plates and one of aspirating solution from M wells into said M pipettes and dispensing solution from said M pipettes into a third set of M wells;

15 aligning a subset of M wells of a fourth one of said plurality of plates with M pipettes of a fourth pipette station; and
lowering said M pipettes of said fourth pipette station to engage the subset of M wells of said fourth one of said plurality of plates and one of aspirating solution from M wells into said M pipettes and dispensing solution from said M pipettes into a fourth set of M wells.

20 23. A method of distributing chemical solutions to a first plate having N wells with I subsets of M wells, I being an integer and greater than one and at least one second plate with about N/I wells, the method comprising the steps of:
aligning a first subset of N/I wells of said first plate with M pipettes of a first pipette station;

lowering said M pipettes of said first pipette station to engage said first subset of N/I wells and aspirating solution from said N/I wells into said M pipettes and dispensing solution from said M pipettes into a subset of M wells;

5 aligning a second set of N/I wells a second plate with M pipettes of a second pipette station; and

10 lowering said M pipettes of said second pipette station to engage said second set of N/I wells of said second plate and aspirating solution from said N/I wells of said second plate into said M pipettes and dispensing solution from said M pipettes into a second subset of M wells and with the proviso that M is about 864 or less.

24. The method of claim 23, further comprising the steps of:

15 aligning a third set of N/I wells of one of said plurality of plates with M pipettes of a third pipette station;

lowering said M pipettes of said third pipette station to engage said third set of N/I wells and aspirating solution from M wells into said M pipettes and dispensing solution from said M pipettes into a third set of M wells;

20 aligning a fourth subset of N/I wells of one of said plurality of plates with M pipettes of a fourth pipette station; and

25 lowering said M pipettes of said fourth pipette station to engage said fourth set of N/I wells of one of said plurality of plates and aspirating solution from M wells into said M pipettes and dispensing solution from said M pipettes into a fourth set of M wells.

25. The method of claim 24, further comprising the step of providing a different solution to wash stations of said first liquid handler, said

second liquid handler, said third liquid handler, and said fourth liquid handler.

26. The method of claim 25, wherein M is equal to 96.

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27. The method of claim 26, wherein N is equal to one of 384 or 864.

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28. A chemical solution distribution system for distributing chemical solutions into multiwell plates having at least 384 wells, the system comprising;

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a) at least one liquid handler comprising 48 or more tips, said tips have a dynamic range of liquid dispensation of 100 to 2000 nanoliters, and

b) an orthogonal positioner, said liquid handler comprise a tip dispensing matrix with about 96 or more tips. being capable of moving said at least one multiwell plate with an X-Y location accuracy of at least +/- 0.09 mm in X and Y.

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29. The device of claim 28, wherein said liquid handler comprises a tip dispensing matrix with about 96 or more tips.

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30. The device of claim 29, wherein said tip dispensing matrix comprises no more than 96 tips.

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